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ABSTRACT

The effectiveness of a procedure for systematically analyzing and intervening with oral reading was investigated with three learning disabled children (10 to 11 years old). Correct and error responses in oral reading were recorded during baseline and experimental conditions (which included contingent teacher praise and antecedent modeling on words erred in the previous day's session). Results showed that significant increases in oral reading performance are possible when precise definition of target behaviors are coupled with clearly delineated intervention strategies and when those strategies are monitored on a continuous basis. (SBH)

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Effect of a Combined Celeration - Error Analysis Procedure on Oral Reading Performance[1]

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Running head: Component Analysis--Oral Reading

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Abstract

Most studies of reading have not significantly contributed to the ability of the classroom teacher to maximize the effectiveness of instruction of exceptional learners. Oral reading represents one particular problem area for classroom teachers. A case study format is used to discuss a procedure for systematically analyzing and intervening on oral reading. A combined celeration trend and error analysis procedure is presented. Sample data is used to show the effect of each procedure.

Effect of a Combined Celeration Trend -- Error Analysis Procedure on Oral Reading Performance[1]

Teaching of reading is perhaps the most frequently investigated curricular area (Harris, 1961; Lovitt & Hurlburt, 1974). Review of the literature discloses a wide variety of studies focusing on numerous facets of oral and silent reading and comprehension skills of exceptional children (Gray, Baker & Stancyr, 1969; Hansen & Lovitt, 1976; Lovitt, Eaton, Kirkwood & Pelander, 1971; Staats & Butterfield, 1965; Stephens, Hartman & Cooper, 1973; Sulzer, Hunt, Konirski, Ashby & Krams, 1971; and, Wadsworth, 1971). However, on the whole, these investigations have not significantly contributed to the ability of the practitioner to maximize the effectiveness of classroom instruction.

The failure of existing studies in the area of oral reading to greatly enhance instruction seems to result from several factors. First, there is a lack of clarity and preciseness on the part of most researchers reporting teaching procedures demonstrated to positively effect oral reading (Fleming, Gable, Moore, Safferstone & Smith, Note 1). However, a greater problem prevails with regard to the lack of accuracy and consistency in identifying specific aspects of oral reading (Starlin, 1971).

A review of selected and related studies of oral reading suggests an absence of precisely defined behaviors associated with oral reading (Fleming, et al., Note 1). This indefinitive reporting of target

responses provides little opportunity for clinician replication. Likewise, inattention to determining current pupil performance diminishes the ability of other researchers to evaluate teaching procedures.

Recently researchers have argued for the direct and daily measurement or oral reading performance (Eaton & Lovitt, 1972; Lovitt, 1975). It has been suggested that such observation include an initial baseline phase (Lovitt, 1975; Starlin, 1971). This baseline tactic provides opportunity to determine the stage of oral reading, e.g., acquisition through developmentally proficient levels. Also, this provides the occasion to pinpoint specific error patterns in oral reading e.g., omissions, hesitations, substitutions, etc., in relation to a particular reading stage.

Thus, there appears to be ample evidence of the necessity to bring increased control to the investigation on oral reading instruction with exceptional children. The various methodological flaws of most studies in the literature today hinders clinical replication in investigating oral reading. In order to more closely evaluate curriculum areas and teaching techniques and therein contribute to the improvement of classroom procedures, existing research practices must be improved.

This paper discusses the relationship of tactics of applied behavior analysis to classroom oral reading instruction. Behavioral research methodologies and procedures that include: a) celeration trend analysis; and, b) error analysis (e.g., Burney, Note 2; Shores, Note 3) strategies are presented. The authors describe various aspects

of the clinician investigation of oral reading which may contribute to more consistent future study of this curriculur area.

General Procedures

Celeration Trend Analysis

Celeration trend analysis describes a method of analyzing rate data which is applicable to the classroom instruction--social and/or academic--of exceptional children. White and Liberty (1976) have discussed the use of trend analysis in relation to observable behavior (in this instance, the concern was with oral reading). During baseline phase, data on correct and error rates are gathered and plotted on 6-cycle graph paper for each student. Next, each rate is separately analyzed to determine the effect of teaching.

Skinner (1969) indicates that behavior which is increasing in rate over trials is under reinforcement control. Thus, an accelerating trend in, for example, correct oral reading rate is assumed to be being reinforced in the desired direction. On the other hand, error rates which are similarily increasing, while considered to be likewise under reinforcement control are not moving in the desired direction.

The principle questions posed by the authors with regard to celeration trend analysis included: (a) is the problem one of discrimination, e.g., is student erroring as a function of being reinforced noncontingently, for both correct and error responses? (b) is the problem one of extinction, satiation, or punishment? And, relatedly, is the problem a result of escape or negative reinforcement? In other

words, is the decelerating trend indicative of a behavior responding to one of these environmental conditions? Or, (c) is the problem one relating to the current schedule of reinforcement operating on the behavior in question? The analysis of trends of data, based on the aforegoing questions, allows certain assumptions to be made regarding instructional problems (Burney, Note 2). A trend line is established as follows: (a) divide a given set of data in half; (b) calculate the median value of each half of the data points; and, (c) plot each median point and connect the two points with a line. Table 1 illustrates the format used to infer possible problem areas of instruction, based on the trend lines for correct and incorrect oral reading responses.

Insert Table 1 About Here

The basis of this questioning procedure is that by discovering and analyzing the various conditions which can be shown to have an effect on behavior, that behavior becomes predictable. To the extent that these events or conditions can be manipulated, the behavior is controllable (Skinner, 1953), e.g., correct oral reading can be changed in a predictable way. The principles of applied behavior analysis utilized in this study are actually tentative statements regarding relationships between oral reading behavior and classroom instructional conditions (Bijou, 1970).

Error Analysis

The second component of baseline assessment pertained to an error

analysis format (Shores, Note 3) intended to more precisely pinpoint the nature of the errors being emitted by each student. The error analysis sequence is presented in Table 2.

Insert Table 2 About Here

As indicated in Table 2, if errors continued to occur during probe sessions, the next step in the sequence was to ascertain if supplementary training appeared to be an appropriate initial tactic. Training sessions would be designed, for instance, according to the type of error to introduce new words or to enhance the discriminative properties of the words. That is, if student X repeatedly errs in correctly reading the terminal syllable, or phase, or fails to include the word ending (e.g., reads careful for "carefully", "tree" for "trees", the omitted segment of the word may be given additional discriminative properties by underlining the errored upon portion (e.g., the word card would read "trees", "carefully"). An error analysis sequence is used in conjunction with celeration trend analysis in assessing word discrimination and/or contingencies currently operating on the oral reading behavior of each student.

In this study, a combined celeration trend-error analysis of baseline data was employed to assess appropriate responses (e.g., acceleration of correct and deceleration of error rates) to the experimental manipulation of subsequent events. In this research project, teacher praise contingent on words correctly read was selected as the initial intervention strategy. In short, the manipulation of reinforcement

contingencies operated as the principle independent variable. Of secondary interest, was the investigation of modified antecedent versus subsequent teaching events, and their effect on oral reading performance.

Method

Subjects and Setting

The students participating in this study included two boys, aged 10 and 11, and one girl, 10 years old. Each of the students were enrolled in a private school for children with learning disabilities. The students were recommended by the classroom teacher to participate in this study on the basis of deficiencies exhibited in oral reading.

The study took place in a private special education center for children diagnosed as learning disabled, located in metropolitan Nashville, Tennessee. The school consists of ten classrooms and provides individualized instruction for children ranging from kindergarten through the eighth grade levels of instruction. The individual daily reading sessions were conducted in a small office-like room adjacent to the student's classroom between 1:10 and 1:40 p.m. The reading lessons were a part of the regular classroom teacher's daily instruction.

Materials

The Harper and Row Reading Series entitled Trade Winds (Level 13) (1972) was used throughout the study as this textbook was currently being used by the classroom teacher with the student's peers.

Procedure

Data Collection and Tabulation

Direct and daily measurement of each student's oral reading performance was accomplished through the use of a tape recorder. Obtaining and maintaining a permanent response vis-a-vis audio tapes facilitated reading analysis procedures. Recorded reading sessions served as probe data for initial assessment and in attempting to evaluate the effect of specific teaching strategies throughout the study.

The data tabulation sheet was used to specify: (a) the date; (b) experimental condition; (c) daily length of the reading session; (d) the number of words/syllables read; (e) the number of words/syllables read correctly and incorrectly; and, (f) the per minute rate of correct and incorrect words.

Reading Responses Recorded

Errors in oral reading were defined as follows: (a) substitutions were any words read in place of those appearing in the selection; (b) omissions were any words deleted for the selection; and, (c) additions were defined as any instance in which the number of words read was increased from the number appearing in the passage. Split-words, e.g., two-thirds, were defined as one word. Repetitions, hestitations and disregard for punctuation marks were not considered as errors.

Graphing

Following each reading session, correct and error responses were tabulated. These data were plotted on 6-cycle semilogrimic graph paper. This graphing procedure, referred to as a 6-cycle daily behavior

charting provided the basis for the celeration trend analysis of each student's reading performance. The advantage of this charting procedure is its predictive validity in estimating future trends in rate(s) of behavior. Further, the chart is sensitive to data for behaviors with either extremely high or low rates and thus no data are "lost" due to ceiling and/or floor effects on behavior (Hersen & Barlow, 1976). Six-cycle plotting was used to identify each student's initial reading skills and to assess the effect of each teacher intervention strategy. In addition, equal interval graphing of each student's daily correct and incorrect responses were maintained to allow a broader interpretation of oral reading responses. A sample of the data are reported in Figure 1.

Reliability

Reliability checks were conducted on the time required to read each passage and the correct and error responses tabulated for each student.

Reading selections of each student were randomly selected. By using a stopwatch and the tape recording, the experimenters re-assessed the timing of each students' oral reading to determine whether the time agreed with the original time recorded. An agreement was defined as any instance in which the original time and the reliability check were within 3 seconds of each other. Rechecking correct and error tabulations consisted of tallying both correct and incorrect words/syllables read for the selections and comparing those to the initial results. In addition, computational checks were made of the

resulting data tabulations recorded on the data tabulations sheets for each student. Reliability was calculated on an agreement-disagreement formula, with the number of agreements divided by agreements plus disagreements then multiplied by 100.

Experimental Design

An ABAB design (Baer, Wolf, & Risley, 1968) with within and across subject replication was used to assess the relationship between the dependent variables, e.g., correct and error responses in oral reading, and the independent variables, e.g., teacher selected instructional interventions.

Prebaseline. A prebaseline phase served to provide a period of adjustment on the part of the students to the potentially confounding qualities of a novel teaching situation, e.g., reading orally individually with each session being tape recorded. On an individual basis each student was simply requested to begin reading on a certain page beginning with a specific paragraph. At the conclusion of the session, following each student's oral reading of approximately 100 words, the teacher indicated that that was all for today and the student could return to the classroom.

Baseline Condition (A_1). During the baseline phase of the study reading sessions were conducted as in the prebaseline period.

Experimental Condition (B_1). Teacher verbal praise, e.g., "good reading", "that's correct", "right", was used as the subsequent intervention strategy contingent on correct oral reading responses. For each 3 to 5 word passage read correctly, contingent praise was delivered

by the teacher. If a student erred within a 3 to 5 word passage, no response was forthcoming from the teacher until the next sequence in which each word(s) were read correctly.

Return to Baseline Condition (A_2). A return to baseline condition was instituted by withdrawing contingent teacher praise for correct oral reading.

Experimental Condition (B_2). Following a return to baseline (and as a result of the continuing analysis of oral reading performance of each student), the original intervention tactic, e.g., contingent teacher praise, was reinstated. The contingency ratio of 3 to 5 words read correctly was, however, thinned across time during this condition. On the average, students' read a 8 to 12 consecutive words correctly before being praised. (The decision to thin the reinforcement schedule was prompted by the celeration trend analysis which suggested that this particular student might be satiating on the reinforcement ration previously used. See Figure 1).

Experimental Condition (B_2C). During this phase an antecedent teaching strategy was added. Students were given instruction by the classroom teacher, in the form of antecedent modeling, on words erred in the previous day's reading session.

Experimental Condition (B_3). During the final phase, teacher praise was reinstated as the principle intervention, antecedent modeling was withdrawn. Contingent teacher praise was delivered on a leaner schedule than during any previous phase. That is, using a thinning tactic. Students were required to read an increasingly greater number

of words correctly to receive praise. Differential reinforcement of higher rates of correct responding (DRH) occurred across the reading sessions.

Results

Reliability

Both correct and error tabulations and timing of each student's oral reading were checked a minimum of two (2) times per student and condition. These reliability checks revealed near perfect agreement as to the tallying of correct and incorrect words/syllables. Agreement within 3 seconds approached 100% in relation to time rechecks. Inter-observer agreement ranged from 94 to 100% with a mean of 98.7% across students.

"Nancy"

Figure 1 presents sample data obtained from the investigation of teaching strategies based on a combined celeration trend--error analysis procedure.

Insert Figure 1 About Here

"Nancy", whose performance was very similar to the others, had a mean correct rate of 56.3 and mean error rate for 4.9 words per minute during baseline. During the first intervention, i.e., teacher praise, mean correct rate rose to 68.9 words and mean error rate fell to 2.8 words per minute. During the third phase (a return to baseline condition) a sharp decline in correct rate (to 48.3 words/minute) was accompanied by an increase in error rate (to 5.4 words per minute). The

fourth phase, reintroduction of teacher praise, led to an immediate increase in correct rate and decrease in error rate; correct rate rose to 76.8, error rate declined to 3.1 words per minute. The next phase, teacher praise coupled with supplemental instruction, resulted in a decrease in mean correct and an increase in mean error rate in comparison to the previous praise only condition. In the final phase, reinstatement of teacher praise only, Nancy's mean correct rate again accelerated to 78.7 words per minute, while mean error rate decelerated to 1.9 words per minute. This represented an overall increase of 22.4 words read correctly and a decrease of 3.0 words erred per minute from the baseline condition. Similar results occurred with the other students participating in the study.

Discussion

To date researchers have failed to discern a pattern of general performance which typifies the oral reading responses of exceptional children. What is required instead, is for the practitioner to have available a range of empirically supported instructional strategies from which to choose specific classroom procedures. The tactics discussed in the preceeding sections in relation to improving the oral reading of learning disabled children are each predicated on the principles of operant technology (Skinner, 1969) which have been successfully translated into precision teaching tactics (Lindsley, 1964; Shores, Note 3). In the authors' opinion such tactics offer the diversity from which to select specific interventions. The direct and continuous observation and recording of target responses is of equal importance to the judicious application of precise teaching techniques

(Starlin, 1971).

Research regarding such important curricular areas as oral reading remains incomplete. The results of this study support the contention that significant increases in oral reading performance are possible when precise definition of target behaviors are coupled with clearly delineated intervention strategies and those strategies are monitored on a continuous basis. The methodological and procedural tactics reported hopefully provide some assistance to the clinician interested in classroom replication. It is our opinion further investigation in clinical settings holds much promise for addressing curricular and tactical questions relating to reading instruction.

Conclusion

This study underscores the importance of attending to several critical variables in respect to oral reading instruction. These critical factors include:

(1) Component analysis of oral reading should include specification of the stage at which the student is performing, e.g., acquisition through developmentally proficient levels.

(2) Assessment of oral reading requires pinpointing of specific error patterns, e.g., omissions, hesitations, substitutions, etc., in relation to a particular stage of reading.

(3) Celeration trend--error analysis facilitates the selection of instructional tactics.

(4) Determination of a performance criteria for each student is necessary.

(5) Teaching tactics must respond to the direct and daily monitoring of individual student performance. These contentions do not necessarily represent all facets of oral reading to be considered by the classroom teacher. However, the authors believe that careful adherence to these critical factors will lead to improved classroom performance of exceptional children in oral reading.

Reference Notes

1. Fleming, E. C., Gable, R. A., Safferstone, M. J., & Smith, D. D. Oral reading performance: A case study and recommendations for future study. Unpublished manuscript. George Peabody College, Nashville, Tennessee, 1977.
2. Burney, J. P. Effects of teacher use of a precision lesson-planning technique on instructional interaction and pupil performance. Unpublished doctoral dissertation, George Peabody College, Nashville, Tennessee, 1977.
3. Shores, R. E. Personal communication, February, 1976.

References

Baer, D., Wolf, M. M., & Risley, T. Some current dimensions of applied behavior analysis. Journal of Applied Behavior Analysis, 1968, 1, 91-97.

Bijou, S. W. What psychology has to offer education--now. Journal of Applied Behavior Analysis, 1970, 3, 65-71.

Eaton, M. D., & Lovitt, T. C. Achievement tests vs. direct and daily measurement. In G. Semb (Ed.), Behavior analysis and education, Lawrence: University of Kansas, 1972.

Everetts, E. L., & Van Roekel, B. J. Traveling the trade winds. New York: Harper and Row, 1972.

Gray, B. B., Baker, R. D., & Stancyk, S. E. Performance determine instruction in remedial reading. Journal of Applied Behavior Analysis, 1969, 2, 255-263.

Hansen, C. L., & Lovitt, T. C. The relationship between question type and mode of reading on the ability to comprehend. Journal of Special Education, 1976, 10, 53-60.

Harris, T. L. Reading. In R. L. Ebel (Ed.) Encyclopedia of educational research, (4th ed.) Toronto: MacMillan, 1969.

Lovitt, T. C. Applied behavior analysis and learning disabilities. Part I: Characteristics of aba, general recommendations, and methodological limitations. Journal of Learning Disabilities, 1975a, 8, 432-443.

Hersen, M., & Barlow, D. H. Single case experimental designs. New York: Pergamon Press, 1976.

Lovitt, T. C., Eaton, M., Kirkwood, M., & Pelander, J. Effects of vicarious reinforcement contingencies on oral reading rate. In E. Ramp & B. Hopkins (Eds.), A new direction for education: Behavior analysis (Vol. 1). Lawrence: University of Kansas, 1971.

Skinner, B. F. Science and human behavior. New York: Free Press, 1953.

Skinner, B. F. Contingencies of reinforcement: A theoretical analysis. New York: Appleton-Century-Crofts, 1969.

Staats, A. W., & Butterfield, W. H. Treatment of non-reading in a culturally deprived delinquent: An application of reinforcement principles. Child Development, 1965, 4, 925-942.

Starlin, C. Evaluating progress towards reading proficiency. In B. Bateman (Ed.), Learning disorders (Vol. 4). Seattle, Wash.: Special Child Publications, 1971.

Stephens, T. M., Hartman, A. C., & Cooper, J. O. Directive teaching of reading with low-achieving first and second-year students. Journal of Special Education, 1973, 1(2), 187-196.

Sulzer, B., Hunt, S., Ashby, E., Koniarski, C., & Krams, M. Increasing rate and percentage correct in reading and spelling in a fifth grade public school class for slow learners by means of a token system. In E. Ramp & B. Hopkins (Eds.), A new direction for education: Behavior analysis (Vol. 1). Lawrence: University of Kansas, 1971.

Wadsworth, H. G. A motivational approach toward the remediation of a learning disabled boy. Exceptional Children, 1971, 38, 33-42.

White, O. R., & Libery, K. A. Behavioral assessment and precise educational measurement. In N. G. Haring & R. L. Schiefelbusch (Eds.), Teaching special children. New York: McGraw-Hill, 1976.

Table 1

An celeration trend analysis procedure for evaluating rate data

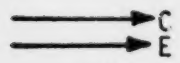
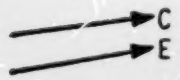
1.		The divergence of correct and error is the desired outcome of instruction, and indicates good discrimination of stimuli and differential reinforcement of desired behavior.
2.		Horizontal parallel trends means that a discrimination problem possibly exists.
3.		Parallel rising trends indicates the possibility that errors are being reinforced.
4.		Parallel falling trends indicate the possibility of extinction conditions.
5.		If correct and error trends diverge to a large amount then run parallel, there is the possibility of a schedule of reinforcement problem.
6.		Convergence of error and correct trends indicates the possibility of discrimination problems and of noncontingent reinforcement.
7.		Rising correct trend with even more sharply rising error trend possibly indicates a contingency problem arising from subjects hurrying to get finished.

Table 2

Error Analysis Sequence

Step 1: Identify initial level of instruction

Step 2: Identify type of error

A) Problem in discrimination

Probe with words erred out of context - flash cards

1) If words read correctly to criterion, analyze contingencies

2) If errors present during probe, analyze errors provide supplementary instruction designed to add to discriminative properties of words erred

B) Random Errors

Probe with words erred out of context - flash cards

1) Probe for recognition; if words read correctly to criterion, analyze data

2) If errors present during probe, provide supplementary instruction designed to teach new words

C) Waiting Probe

Probe with words erred out of context -flash cards

1) If student omits and/or waits for model of word, analyze data, then analyze contingencies

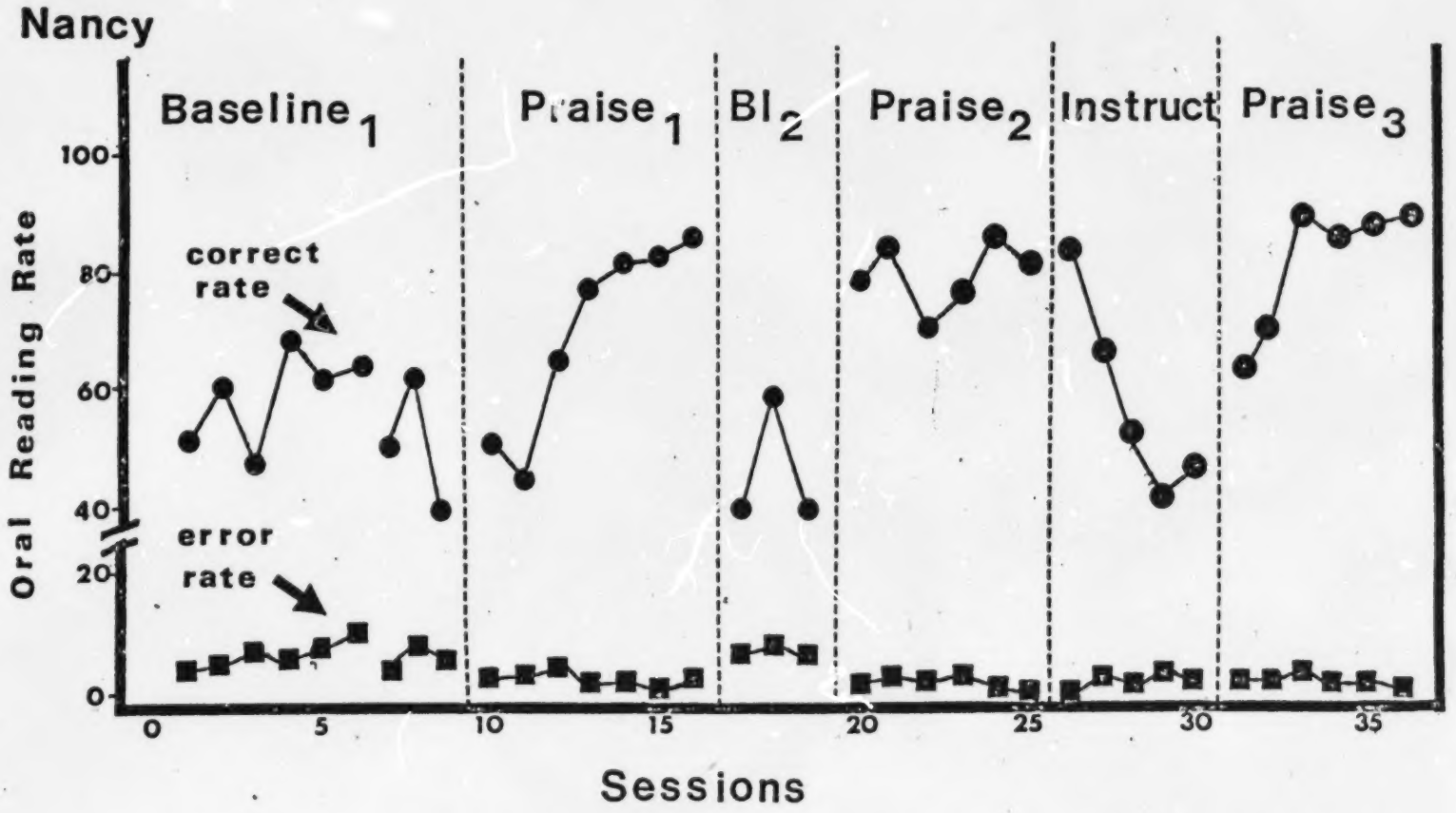
Step 3: Implement remedial instruction

Step 4: Evaluate probe data - trend and error analysis

Modify instruction as required

Figure Caption

Figure 1. Sample data illustrating the effect of celeration trend and error analysis procedure on oral reading performance.


Nancy
Baseline 1
Praise 1
BI 2
Praise 2
Instruct
Praise 3
Oral Reading Rate
correct rate
error rate
100
80
60
40
20
0
0
5
10
15
20
25
30
35
Sessions